

Periodic Trends

Your Tasks (Mark these off as you go)

- ☐ Assign group roles
- ☐ Define key vocabulary
- ☐ Arrange the elements in a way that “makes sense”
- ☐ Arrange the newly discovered elements
- ☐ Complete the reflection
- ☐ Receive credit for this lab

☐ Assign group roles

Before you continue, record your group number, then collaborate with your group and assign each person a role. Each role and a description is provided below.

Project manager (PM)	Leads the team discussion and keeps the team on task and on schedule. Make sure the final lab is submitted.
Communication Specialist (CS)	Presents answers (or questions) to the class, instructor, or other teams.
Recorder (R)	Ensures that all members have correct answers. Considers how the team is working and ensures all voices are heard.

Group Number:	
Name	Role

☐ Define key vocabulary

Groups (as they apply to the periodic table)

Periods (as they apply to the periodic table)

Alkali metals

Alkali earth metals

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Halogens

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Noble Gases

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Ionization energy

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Atomic radius

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Cation

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Anion

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Electronegativity

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❑ Arrange the elements in a way that “makes sense”

Inspect the properties of the known elements below,

Atomic Mass 40 Physical state: Gas Density: 0.00178 g/mL Hardness: None Conductivity: Very poor Oxidation number: 0 Melting point: -189.2°C Atomic radius: 71 pm	Atomic Mass 137 Physical state: Solid Density: 3.6 g/mL Hardness: Soft Conductivity: Good Oxidation number: +2 Melting point: 710°C Atomic radius: 253 pm	Atomic Mass 9 Physical state: Solid Density: 1.85 g/mL Hardness: Brittle Conductivity: Excellent Oxidation number: +2 Melting point: 1287°C Atomic radius: 112 pm	Atomic Mass 80 Physical state: Liquid Density: 3.12 g/mL Hardness: None Conductivity: Very poor Oxidation number: -1 Melting point: -7.2°C Atomic radius: 94 pm
Atomic Mass 133 Physical state: Solid Density: 1.87 g/mL Hardness: Soft Conductivity: Good Oxidation number: +1 Melting point: 29°C Atomic radius: 298 pm	Atomic Mass 40 Physical state: Solid Density: 1.55 g/mL Hardness: Somewhat soft Conductivity: Good Oxidation number: +2 Melting point: 842°C Atomic radius: 194 pm	Atomic Mass 12 Physical state: Solid Density: 2.1 g/mL Hardness: Soft, yet brittle Conductivity: Good Oxidation number: +4, -4 Melting point: 3550°C Atomic radius: 67 pm	Atomic Mass 35 Physical state: Gas Density: 0.00321 g/mL Hardness: None Conductivity: Very poor Oxidation number: -1 Melting point: -101°C Atomic radius: 79 pm
Atomic Mass 64 Physical state: Solid Density: 8.96 g/mL Hardness: Somewhat soft Conductivity: Excellent Oxidation number: +1, +2 Melting point: 1803°C Atomic radius: 145 pm	Atomic Mass 70 Physical state: Solid Density: 5.904 g/mL Hardness: Soft Conductivity: Medium Oxidation number: +3 Melting point: 30°C Atomic radius: 136 pm	Atomic Mass 114 Physical state: Solid Density: 7.31 g/mL Hardness: Very soft Conductivity: Medium Oxidation number: +3 Melting point: 113.5°C Atomic radius: 156 pm	Atomic Mass 127 Physical state: Solid Density: 4.93 g/mL Hardness: Soft Conductivity: Very poor Oxidation number: -1 Melting point: 113.5°C Atomic radius: 115 pm
Atomic Mass 207 Physical state: Solid Density: 11.35 g/mL Hardness: Somewhat soft Conductivity: Poor Oxidation number: +4 Melting point: 327.5°C Atomic radius: 154 pm	Atomic Mass 7 Physical state: Solid Density: 0.534 g/mL Hardness: Soft, claylike Conductivity: Good Oxidation number: +1 Melting point: 180°C Atomic radius: 167 pm	Atomic Mass 20 Physical state: Gas Density: 0.00090 g/mL Hardness: None Conductivity: Very poor Oxidation number: 0 Melting point: -249°C Atomic radius: 38 pm	Atomic Mass 14 Physical state: Gas Density: 0.001251 g/mL Hardness: None Conductivity: Very poor Oxidation number: -3 Melting point: -210°C Atomic radius: 56 pm
Atomic Mass 16 Physical state: Gas Density: 0.001429 g/mL Hardness: None Conductivity: Very poor Oxidation number: -2 Melting point: -218°C Atomic radius: 48 pm	Atomic Mass 39 Physical state: Solid Density: 0.86 g/mL Hardness: Soft, claylike Conductivity: Good Oxidation number: +1 Melting point: 63°C Atomic radius: 243 pm	Atomic Mass 108 Physical state: Solid Density: 10.5 g/mL Hardness: Somewhat soft Conductivity: Excellent Oxidation number: +1 Melting point: 961°C Atomic radius: 165 pm	Atomic Mass 23 Physical state: Solid Density: 0.971 g/mL Hardness: Soft, claylike Conductivity: Good Oxidation number: +1 Melting point: 98°C Atomic radius: 190 pm
Atomic Mass 119 Physical state: Solid Density: 7.31 g/mL Hardness: Somewhat soft Conductivity: Good Oxidation number: +4 Melting point: 232°C Atomic radius: 145 pm	Atomic Mass 131 Physical state: Gas Density: 0.00585 g/mL Hardness: None Conductivity: Very poor Oxidation number: 0 Melting point: -120°C Atomic radius: 108 pm		

Locate the JamBoard the corresponds to your group.

https://jamboard.google.com/d/1cWC2KjaZ6aSXp66lr_1joQGcp8j8ff2ThUOI1HmupQQ/edit?usp=sharing

WITHOUT LOOKING AT A PERIODIC TABLE, arrange the cards of the known elements in a way that makes sense based on the data you have been provided for each element.

Provide an explanation for why you arranged the elements the way you did.

Looking at your table from left to right, which property or properties increase or decrease? Looking at your table from top to bottom, which property or properties increase or decrease?

❑ Arrange the newly discovered elements

Inspect the properties of the newly discovered elements below,

Atomic Mass 27 Physical state: Solid Density: 2.7 g/mL Hardness: Soft Conductivity: Good Oxidation number: +3 Melting point: 660°C Atomic radius: 118 pm	Atomic Mass 11 Physical state: Solid Density: 2.46 g/mL Hardness: Hard, brittle Conductivity: Good at high T Oxidation number: +3 Melting point: 2075°C Atomic radius: 87 pm	Atomic Mass 19 Physical state: Gas Density: 0.001696 g/mL Hardness: None Conductivity: Poor Oxidation number: -1 Melting point: -220°C Atomic radius: 42 pm	Atomic Mass 73 Physical state: Solid Density: 5.323 g/mL Hardness: Hard, brittle Conductivity: Somewhat Oxidation number: +4 Melting point: 938°C Atomic radius: 125 pm
Atomic Mass 24 Physical state: Solid Density: 1.74 g/mL Hardness: Somewhat hard Conductivity: Good Oxidation number: +2 Melting point: 650°C Atomic radius: 145 pm	Atomic Mass 28 Physical state: Solid Density: 2.33 g/mL Hardness: Hard, brittle Conductivity: Somewhat Oxidation number: +4, -4 Melting point: 1414°C Atomic radius: 111 pm	Atomic Mass 32 Physical state: Solid Density: 1.96 g/mL Hardness: Brittle Conductivity: Poor Oxidation number: -2 Melting point: 115°C Atomic radius: 88 pm	

Locate the newly discovered elements,

<https://drive.google.com/drive/folders/1neyNtKDoFmb7YK0aWBuCdGCoMIQEufW?usp=sharing>

Work with your group to decide where these new elements should fit in your table.

For each newly discovered element, provide an explanation as to why you chose to place it where you did on your periodic table.

Atomic mass 27

Atomic mass 11

Atomic mass 19

Atomic mass 73

Atomic mass 24

Atomic mass 28

Atomic mass 32

❑ Complete the reflection questions

How does the arrangement of your elements and the “newly discovered elements” compare to the actual location on the periodic table?

Look at your periodic table. In general, what happens to each of the following properties as you (a) go down a group (b) Across a period. (c) For each trend provide a rational.

I. Density

- (a) Down a group
- (b) Across a period
- (c) Rational

II. Oxidation number

- (a) Down a group
- (b) Across a period
- (c) Rational

III. Melting point

- (a) Down a group
- (b) Across a period
- (c) Rational

IV. Atomic radius

- (a) Down a group
- (b) Across a period
- (c) Rational

V. Conductivity

- (a) Down a group
- (b) Across a period
- (c) Rational

☐ **Receive Credit for this lab**

Each group member must complete and submit their own lab to receive credit